

ABSTRACT

Tantalum-based ceramics are suitable for use in thermal protection systems. These composite structures have high efficiency surfaces (low catalytic efficiency and high emittance), thereby reducing heat flux to a spacecraft during planetary re-entry. These ceramics contain tantalum disilicide, molybdenum disilicide and borosilicate glass. The components are milled, along with a processing aid, then applied to a surface of a porous substrate, such as a fibrous silica or carbon substrate. Following application, the coating is then sintered on the substrate. The composite structure is substantially impervious to hot gas penetration and capable of surviving high heat fluxes at temperatures approaching 3000°F and above.